PYRO»TECHNICS

The Now & Then Newsletter of
GENERAL TECHNICS

Created & Perpetrated by
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TO GRETCHEN: AN APOLOGIA

The older I get, the more I begin to see how similar we are in many ways. You make science fiction costumes. I write science fiction. Both of us are intensely suspicious of anything too terribly "stylish." "Everybody's doing it" is the best reason not to do something to our way of thinking. Disco, Rocky Horror Picture Show, and Sports come to mind as a representative list of stylish things we both see with a jaundiced eye. I suspect this is because we were either born or raised with an unshakable conviction to confront perpendicular edges to all holes presented to us, round or square.

We diverge at one point, however, and the potential bitterness of the difference troubles me greatly. Almost four years ago, I discovered computers, to my tremendous delight. You never understood that delight. Your contention is that computers distract from human concerns, and that by giving so much of my time and energy over to computing, I was throwing away some part of my essential humanity.

This column is more than a Jeff Duntemann rehash of Why I Like Computers. I want to demonstrate to you and everyone that computers are not only a terribly human invention; they are the most human creation yet to roll out of the imagination of mankind.

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Man made tools, it is said. Wrongo. Tools made Man. The desperately brilliant chap who grabbed a pointed stick and used it to stop a charging boar not only invented a terrible power--he lived to make more love, more babies, and more legend. People who latched onto the concept of making nature do part of their work lived longer and easier, enabling them to spend time making better and better tools. Tools and Man made each other, in a sense--converging strands winding ever more tightly into an unsnappable cable girdling the planet Earth.

Tools exist to make the application of human energy more efficient. I could grunt and groan and rupture myself lifting a 200 pound stone--but with a lever and a couple of rocks it becomes a cinch. Instead of going home ruptured and exhausted, I build a house from stones heavier than myself. Energy which I might have expended lugging stones I can now devote to more cleverly designing a better house.

All tools work this way, even the most complex. With a collection of levers and edges, a person can make almost anything, given infinite time. The proper tools do nothing more than cut down the required time and energy to do the job right.

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Fine. But what IS a tool? What makes it work? My analysis of tools tells me that all tools require three inputs to make them useful: Mechanism: the physical form of the tool. Motive power: the oomph that makes it go. And--think about this one--Direction: the human-conceived and human-guided plan that channels mechanism+power on a path that results in something more than the raw materials remaining when the job is done.

Our mechanisms and our power sources have grown tremendously sophisticated since 1900. And until recently, that third essential element--call it diretion, or perhaps skill--was looked upon as some spiritual essence proceeding from the mind alone. Only God can make a tree--and, until recently, only Mind could extract cube roots. Tools were limited to pencil and paper, and later, to a series of scratches on a couple of bamboo sticks.

But look at these tools: methods learned by rote in high school math classes, logarithmic tables committed to linear form. Parlor tricks! Why? Because a slide rule does only one thing, which is to manipulate a table. Will the method for extracting cube roots extract fourth roots, or fifth? Not the way they're taught, which is as special, simplified instances of a difficult general method, which itself is good for nothing but extracting roots. Just more playing with tables. All the "thinking" was done long beforehand to create the tables.

The direction required to make a tool do its thing can be looked upon as feeding the tool information about what must be done. Where does this information come from? Ultimately, it came out of somebody's head, as a result of that somebody pondering the solution of a problem. Given a problem, a method can be found to generate those bits of information which will interact with some tool to provide a solution.

Yet, as in peeling the onion, we find another layer here. Where does a problem come from?

Where indeed?

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is an organization of fannish techies (and not techie fannies, as some wiseass reported) who pool information, resources, and experiences in pursuit of a good time and an occasional profit. The group meets mainly at cons, hamfests, and private Berserker Weekends.

BECOMING A MEMBER assumes you're willing to contribute to the group. This entails answering questions (at very least) by phone or SASE, concerning your own personal areas of expertise. So that people know what those areas are, you must submit a completed questionnaire and be listed in the General Technics Information Handbook. To obtain a questionnaire, send an SASE to:

Jeff Duntemann
301 Susquehanna Road
Rochester NY 14618

THAT DONE, return the questionnaire, a quantity of first-class stamps, and one American dollar bill. You will receive PyroTechnics until your stamps run out. You will know your brethren by the symbol they wear, and if you spot the symbol on a bicycle seat, well, then, sit on it!

Ponder for a second that bane of undergrad physics classes, your awful, intimidating Word Problems. You are confronted with a jumble of given facts, and asked for a solution. You know as well as I that the skill lies in *formulating the problem*. Once the problem is formulated, the rest is shuffling tables, either on bamboo sticks, in an LSI chip, or, God love you, in your head.

Now we stand on bedrock. *The bottom-line distinguishing characteristic of the human race is its ability to formulate problems.*

This is the real work of the human race. This, ultimately, is what being human is about. So what tools do we have to help us formulate problems? Bloody damned little.

The paramount tool of the basement electronics techie is called a protoboard. It's a white plastic block with zillions of little holes in it. You can plug IC's and transistors into the holes and hook them up by sticking wires and resistors and such into the adjacent connected holes. If a configuration doesn't work, you yank a wire and stick it in someplace else. Fast. About as fast as you can think it out.

How about a protoboard for problem solving? Take a boxful of small, limited, easily understood procedures, and plug them into a quick-change matrix. Switch them around until they produce your desired problem statement. Not at random, obviously. But the deep recesses of the subconscious mind, the place where problem statements ultimately come from, speak vaguely and incompletely. They rarely give the whole, detailed statement; what they provide are some inspirations, some vague guiding directions. A problem-statement engineer (generic engineer?) could sit down at such a protoboard and, guided by the narrowly imprecise but broadly true intuitions of his subconscious, create a refined problem statement by gradually eliminating the "fuzz" from the statement's edges.

Approximations of such an instrument exist today. They're called computers.

With traditional tools, the power of the tool increases as it grows more specialized and specific in its application. With computers, power grows the more *generalized* the computer grows. This, you'll see after a moment's thought, is enormously more difficult. The universe is a complex, diverse place. Creating a general-purpose tool for breadboarding problems means the tool must look behind the gritty details of reality to the broader and more generally applicable truths lying underneath. And that, good friends, is a bitch.

Computers were created as superrapid adding machines to design cannon trajectories. It took the protean wizard Alan Turing to point out that given enough time, a computer can perform *any* possible permutation of information. Since then, it has been the task of computer science to devise ways of guiding computers toward desired permutations of information in a hurry. We've done well. Computers did not exist, not in any form, anywhere, at any price, more than 35 years ago.

And we are getting there. Out in California, which often seems to have a monopoly on Good Stuff, Xerox scientists have a gadget called an Alto, on which runs a program called Smalltalk. Smalltalk permits you to "build" little "objects," each of which has a function, limitations, and a method of use. Smalltalk then enables you to combine these objects in different ways to make them do things. Most of the things they do have nothing to do with computers. Most of the things done with Smalltalk, in fact, serve to amplify and make easier pursuits long seen as the most purely human: music and art. Even more important, they enable the young, the poorly coordinated, the something-less-than-brilliant to create beautiful things and feel good about them.

Tell me, *please* tell me, what could be a worthier, more *human* tool than that?

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Sure, I'm fascinated by gadgets, and computers are gadgetry in spades. But my favorite and most important hobby is thinking for the sake of thinking. I am opposed to drug use for that reason, and not because it's illegal: Drugs diddle with your brain, and, Woody Allen notwithstanding, my brain is my first favorite organ. The drug subculture has had ten or fifteen years to convince me that drugs enhance mental processes, and they have failed utterly. Drugs make you relax perhaps, and may make you see pretty colors, but they also tend to make you passive and rather un-original. I'm looking for a lever, not a down comforter.

The most important use Ariel has right now is helping me write stories. He's also helping me write this essay by taking care of the dumb, distracting stuff like feeding paper into the mill and eliminating typos. He's letting me devote that little larger fraction of my energy to thinking more clearly and expressing myself more vividly.

Someday I hope I will be able to buy a program like Smalltalk for Ariel or his successor which will let me design starships and aliens and devise planetary chemistries without running myself ragged looking for information or pounding it into useful form. Someday I hope that you, my sister, will have a screen to draw costumes on, a computer to automatically calculate how much cloth must be bought and in what size pieces, a printer to generate a paper pattern, and a dealer file to find out who's got it on sale this week. I wish for you a box to make even the most complicated costuming not only possible but delightful. I suspect that such a thing might make us better friends.

Every one of us has dreams and latent talents, each one pointing to a different direction in the infinite firmament of human creativity. Ultimately, computers are for filtering out the dull busywork and turning loose the Real Stuff in all of us, the human stuff, the stuff that makes us people and not rotework machines. We're not there yet. But we haven't been at it long.

So truce, kid, and bear with me--we're both reaching for the same thing.

Dumb Questions

by Chuck Ott

I'm sure I'm not the first person to have observed this, but I'm getting dumber as I grow older. More and more, I find the simplest questions, things I should have learned in grade school, coming back to me like the taste of yesterday's pizza.

For example, I've been wondering ...

Where do rivers come from?

This one occurred to me while I was out walking in Riverside the other week. (Riverside is a suburb of Chicago, very nice in a so-snooty-you-could-drop-dead sort of way.) I wandered down into the park and spent a very pleasant half hour lounging in the fall sunshine by the banks of the Desplaines River.

The water-marks on the banks showed clearly that this river was rarely as much as a foot higher than it was that afternoon. I don't ever recall hearing of the Desplaines running dry, either. So the water flow must be more or less constant; most of the rivers here in the flat Midwest, in fact, are steady and reliable that way.

I know that rivers are supposed to be formed from run-off rainwater, collected over all the branches and tributaries of the river. So how does the river average all that water out, to run so constantly?

Does this mean that the amount of rainfall over all the tributary area always averages out to about the same amount? I find that hard to believe. For that matter, I don't believe it was raining that day anywhere between Chicago and Wisconsin -- so where did all that water come from? Certainly the river would continue to run for a couple of days without fresh rain, but really, how long can it take for any particular drop of water to make the trip from the tributaries to where I was? I know the river's gone merrily on through droughts that lasted several weeks.

It also might be that the rainwater soaks into the ground, then percolates a little at a time into the riverbed. But if the water is oozing from dirt banks into the water, wouldn't it carry a lot of soil with it? The Desplaines isn't that muddy.

Where does that constant flow of water come from?

Why are the veins in my wrist blue?

Working at a desk eight or ten hours a day gives me my fashionable urban pallor. My skin is pale enough that I can look at the inside of my wrist and trace my veins. They're a dim blue color. Are yours?

But I have had the experience of having a pretty young nurse tap into my veins and draw off a pint of blood into a clear plastic bag. (This is a kinky thrill I recommend to you; lots of people would like to have your blood, you know.) I've seen my own blood just as it flows in my veins. Like everybody else's blood, it's dark red. Arterial blood is a snappy scarlet color.

Nobody actually has blue blood. Why do my veins look blue?

Why aren't people covered with hair?

As we readers of National Geographic know, the prehuman ancestors of man were brutish-looking half-apes who shambled along on their rear legs and were covered with hair. Somewhere along the trail that leads from tree apes to Linda Ronstadt (my vote for the culmination of mankind), men lost most of their body hair.

Why? I can certainly see how people came to survive without hair -- unlike most apes, we can go to Bloomingdale's and buy fur coats, instead of having to grow them.

But it seems to me that in order for evolution to have preceded on a course from hairy apes to hairless men, there must have been some survival advantage to not having hair. In other words, there had to be some positive benefit from losing our hair. This benefit had to be sufficiently great to overcome the disadvantages of not having hair on chilly winter nights.

Can you think of any advantage to not having a built-in fur coat? I don't think there would have been a problem with over-heating; I assume our ancestors shed every spring just like the cats that will be making a mess of your rugs. If cats have survived this long with hair, why didn't those early tree apes?

Why is the inside of a refrigerator cold?

Actually, I know how refrigerators work. I just don't know why.

A refrigerator is basically a loop of copper tubing with a compressor at the bottom. The tubing is filled with an inert gas like Freon. The compressor squeezes the gas down into a liquid, and pumps it through the loop of tubing.

The top of the tubing goes around the refrigerator box. The gas is cold going thorugh this part: it soaks up heat from your salami and beer. When the gas reaches the bottom where the compressor is, it has picked up a lot of heat and is relatively warm.

Now, when the compressor squeezes the gas down, the temperature of the gas rises. The gas flows into a section of tube goobered up with fins which allow this heat to transfer to the air; this is where the warmth at the back of the refrigerator comes in. So now, the Freon is cooled off to something like room temperature.

Now comes the tricky part. When the gas leaves the finned part (the "heat exchanger") and flows back up, it passes from a narrow tube into a larger portion and it expands. When it expands, the temperature of the gas drops. This is why the gas is cold when it flows past the refrigerator box.

Why does gas turn cold when it expands?

If temperature is a measure of how fast the molecules are moving (as I've been told), shouldn't the gas molecules be moving just as fast after the expansion as before? Why should they slow down? All you've done is to add a little vacuum, which is nothing at all. Shouldn't each molecule remain at the same temperature?

Well, I don't really expect anybody to write in and tell me these things. If I had a little more scholarly drive, I'm sure I could look all this stuff up myself. But I'm sure curious to know ...

Are you folks losing your education as fast as I seem to be losing mine? I have an uneasy feeling that at one time I really did know all of these things.

******************CHEELA JOKES!*******************
>>>de George Ewing.........................WA8WTE

Q. Why did the Cheela applaud when the Mesklinite fell off the cliff? A. All Cheela appreciate slow motion aerial ballet. Q. Why did they go home before he hit the ground? A. After a few hours it got boring, and besides, it was lunchtime. Q. Why did they return to witness the impact? A. Cheela never miss a good, loud, rock concert. Q. What did the Cheela do with his General Products hull? A. He sent it back to the chef...too runny!

SQUARED OFF THOTS Heat Resistant

from Dave Corner
6948 N. Ashland Av.
Chicago, Ill. 60626

All praise the Handbook!!!!

PLACE TITLE HERE:
SINCE I CANCELLED A TRIP TO DALLAS, I HAVE SOME BUCKS TO SPARE FOR A CLARINET; WHAT'S MORE, I JUST GOT A C.R.C. HANDBOOK OF CHEMISTRY AND PHYSICS SO'S I CAN LOOK UP THE MAGNETIC ROTATORY POWER OF BUTYLETHYLCARBINOL IN THE PRIVACY OF MY OWN HOME, AND I KNOW WHAT MAKES THE INVISIBLE BOMBER INVISIBLE BECAUSE I HAVE SOME OF THE STUFF -- WHAT BETTER TIME TO BUILD A KILN ???

Let me explain. I mean, how many things in your life relate to one another, except that they all vie for your time? I mean, besides the basic biologicals? I mean, how do you tell when to learn and when to apply knowledge?? I mean, what do I mean?

Well, to put it piece by piece, I have tried some of the following things to get a small business going:

A.) With a partner, formed Zero-G, which was to make a quick few bucks or go under. Went under. Initial market research indicated that women would love to have nude male dancers as part of a catered party package, and we had lined up a couple of guys who had done so before, but were looking for agents to set up more gigs. No living to be made here, without an advertising blitz or stroke of blind luck.

B.) Am playing with formula P/490 Pressistor compound. This is powdered diode wafers in epoxy. At about one psi applied pressure, a thin film of this, cured between two electrodes, goes from a few hundred megohms to a few ohms in ***ONE NANOSECOND***!!! It is also the Invisible Bomber paint- diodes convert incoming microwaves into noise all over the spectrum, thus scattering the radar pulse. Ask for P/490 compound, currently $50.00 per oz., from :

Innovation Labs
P.O. Box 10003
College Station, Tx. 77840

Stay tuned for more details here.

C.) Currently, my business partner and I are gearing up to get into the ceramics trade- selling clay wares of our own manufacture. Much potential is in evidence here for a good, steady business, and we hope to get in on the technical end of it too.

BREATHER

Q: How do you make a techie foam at the mouth??
A: Spike his beer with microencapsulated detergent!

END OF BREATHER

Anyway, as they say in the vernacular, we went kiln-shopping recently, and I must say that ceramists are being victimised by some real fin de siecle (italicise when you say that, pardner) technology. I have seen books by "experts" on kiln building, and they claim that smooth, shiny white kiln interiors "reflect" heat better, therefore making for more even heat distribution.

Well, they certainly reflect light better, and some of the radiation from a flame or filament is visible, but this is quickly absorbed after a few reflections, and thereafter bounces'round as longwave infrared for endless times around the thing, since the walls and contents are at subluminous or luminous temperatures. Therefore, with most energy as infrared, we wish to distribute this as evenly as possible, and what is called for is an excellent infrared emitter known as a 'blackbody'. This is a flat black surface, preferably studded with concavities of various dimensions. We are working on designs for just such kilns- the Blackbody Kiln. These will also have an accurate temperature transducer - and these need not be so expensive as one might think, with a little technical know-how - plus circuitry to allow for a programmed temperature cycle of any set of temperatures and times, rates of rise and fall, etc.

If you think these are needless fripperies, try asking a potter sometime what it takes to get consistent results with a particular glaze, especially any unusual effects one wishes to reproduce consistently. It almost can't be done, and then, it requires an expensive pyrometer and a lot of kiln-tending. Many glazes require a particular rate of cooling through their softening point to crystallize well, and this may be through a narrow range of, say, 570 - 530 C. The microprocessor or simple TTL circuitry can come to the rescue here. A cheap pull-through card reader allows one to feed in an operating curve, and closing the door starts it up!

So, as I implied in the title, I have built a table-top kiln, drawing 500 watts, and getting to a good 2000F.

It needs a Mark II, however; the door is not well sealed to hold heat, and the poor Nichrome (toaster wire) element is still trying its heart out to please, all sagging and half oxidized away. I am looking into commercial high temperature elements, and have a few ideas for some of my own. Why does Rhenium have to be so damn expensive?

By the way, any techie not familiar with clay should get with it!! Here we have nought but powdered alumina rocks, mixed with varying amounts of water to form a substance of mind-boggling formability.

A great deal of water, plus an agent to reduce bonding of particles in the wet state, makes slip, which can be swirled around inside a plaster mold. As the plaster sucks up water from the slip, clay condenses on the mold walls, and we can build up a hollow-shelled pitcher or other shape. They are still made this way commercially.

Clay is often worked at putty consistency, with slip acting as a solder and polish. It can dry to the leather hard state, and be carved with a knife. The cut edges all but shine after firing, they are so smooth and flat. Further drying to bone dryness allows sanding and final finish. Firing then drives off all water, and the particles soften and fuse, locking up the form permanently. I hope to see some technical applications here, from slip-molded cases for hand lasers, (the toy kind, anyway), to high temp heating elements and insulators. Also, I will be able to turn out custom pieces of material, such as handles, mounting plates, spacers, and what have you, much more cheaply than a plastics house. Try clay!! It's "psychonetic"!!

BULLETIN!! Coming soon in a Big-Kid 'Zine - the all new, vastly improved (especially the illos, thanks to a new fleet of Rapidographalia) Monode Primer! Yes, the very one that appeared in this very 'zine in '76, has been bought by Wayne Green for a hunnert twenny bucks, and will soon grace the pages of 73 Magazine. I feel I owe Jeff D. a percentage for prodding me to get the thing out the door in earnest. Maybe I'll drop him a jar of COSMAC polish on some auspicious holiday or other occasion. Look for the April issue, as a good bet.

A NOTE ON THE COMPUTER SCENE:

Do you remember the popularized image of the computer of the future ballyhooed in the literature of the late fifties and early sixties? I recall in particular that they held out the promise of checking the proliferation of paper use in this country by 'doing everything electronically' and thus saving tons of file folders and scratch paper.

What a load of infrared laser-fried BALONEY!!!

Allow me to Asimov you with some multiplication and trailing zeroes (based on experience at Time, Inc., publishers of Time magazine and so on):

Assume Time, Inc. has only twenty line printers. This is an underestimate.

Assume that they only run sixteen hours a day due to frequent paper changes, jamming, etc.

These are 2000 line per minute printers. That works out to 38.4 million lines per day.

Now, assume a secretary types about 40 WPM (at ten words per line) for five hours a day, allowing for all of the time of day spent not actually typing. This works out to 1200 lines per day. Thus, the line printers equal 38.4 million/1200= 32,000 secretaries!! At current rates, this would run up a tab of over $500 million a year, exclusive of supplies and building overhead, plus bosses all the way up the pyramid of management.

Obviously, before the advent of big systems, Time,Inc. simply did without the services rendered by the printers.

What service is this?? Assembly listings, core dumps, test run data listings, Payroll department printouts which weigh fifty pounds, and are printed every week and kept in huge binders until next week. These latter are kept on hand in case a few peoples' checks don't get printed, and they need to manually adjust the books.

Labor saver, maybe the computer is. But, for this, Oregon must be stripped to the soil?? You can't recycle paper forever. The repeated mulching and bleaching turns big fibers into little ones, and little ones into goo. Mayhaps this wondrous service is still a little in the future?

As for the Information Handbook, I recall a few past issues of Pyro carrying articles on who to buy from (and who not) for things techie. This would be a valuable addition to the book if expanded into a regular set of listings on various subjects- sure, you can find info almost anywhere, but why should fifteen hobbyists each spend a weekend leaving sixty thousand feet of eyetracks all over the local library, when a few knowledgeable GTers can pool their resources and put together some easy reference stuff for the rest, and let the projects get off the page and into practice? Some listings I'd like to see (and am willing to do some work on) are:

* Basic bibliographies for beginners in various arts and fields of endeavor. Annotate the list to let the folk know which book for which type of knowledge (good intuitive grasp, good source of information, good illos and examples, etc.) so they don't have to shop around in order to approach the subject properly.

* Where and where not to buy; how to buy. This could be put up in an expandable form for future updates.

* Basic how-to on various crafts and so on. Messrs. Johnson and Proni demystified much of the arcane art of Plexiglas for us, thus saving experimenters the expense of finding all the wrong ways of doing things. I can do some of the same for electronic project construction, later clay work; who wants to tell us about watercraft from rowboat to battleships? Or small business management, buying a piece of used equipment versus renting, buying new, theft?

Let the information flow!

End of Squared Off Thots.......................

GIGO

FROM JON SINGER--I find I must take issue with your editorial in Pyro 25. Let me try to take this point by point, to keep my head straight (hay fever has reduced me to a pile of used Sudafed).

1. "The greatest single factor that turns me (and many other Americans) off to the women's movement is the all-pervasive, all-consuming chaotic fury that runs through the minds of many of its leaders. They will leap upon something and tear it apart with little or no careful examination if they suspect some slight upon women exists there."

I'm afraid you owe the movement a little better than that. I will immediately grant that the fury is there. What you seem to have' missed is the reason why they are furious. Do a little research into the background of the women's movement, into the facts of life in this culture that drive women to fury or madness. It's time that you developed a little sympathy for the movement, and until you fully understand why these people are furious, then you won't be capable of it.

(Crap. I owe the movement nothing more than non-sexist behaviour and a rational hearing-out, two things I owe all human beings regardless of sex. Fine-tune your sense of history, and take a broader look at our culture. Things aren't that bad anymore. Before 1965 there was some cause for fury; before 1920 there was even cause for madness. In 1980 there is some cause for irritation, but it's fading. I watch the women's movement VERY closely. Some of these people are furious because they're spoiled brats; some of these people are furious because they're bored; some of these people are furious because they like being furious and aren't good at much else. In 1980 competant women aren't wasting their energy being furious; they're digging in and making a place for themselves on equal terms with men. It's happening all the hell over the place. Take your damned blinders off.)

2. "Deliberately using 'they' when the singular 'he' is called for makes me vomit."

Why? That is a perfectly valid usage in many languages, and I wouldn't be surprised to find that it has been at one time or another correct in English as well. Remember always, the finest characteristic of the English language is that it can borrow from everywhere. As to why one would one would wish to substitute the gender-nonspecific plural for the ordinary singular, see below.

(The curse of most other languages is the everpresent ambiguity inherent in the syntax and grammar--largely because one word can mean many different things. English, by comparison, is sharp as a razor; it can slice fine gradients of meaning in places where speakers of Romance languages must revert to waving their hands wildly and rolling their eyes in frustration. 'He' and 'they' are two different words meaning two different things. Trying to hammer them into synonyms violates the precision of English grammar and dulls the cutting edge of the language. English borrows when it needs to borrow--that is, when it feels a lack. Here there is no lack.)

3. "The word 'man' has meant 'one person' or 'one human being' of either sex [sic] longer than the additional (and distinct) meaning, 'one male human being'. 'Man' comes from the Sanskrit 'manu' with that same meaning--no gender is implied. The second meaning is three thousand years younger, and easily identifiable with a little attention to context."

A. You used 'gender' correctly the second time. Why did you muck it up and use 'sex' the first time?

(Because that's the way to use both words correctly, Shakespeare. Call off your '[sic]'; where the hell did you learn English? 'Sex' is a quality of human beings; 'gender' is a parsable attribute of a word. The word 'sex' in the first sentence refers to the concepts of 'person' and 'human being.' In the second sentence I was parsing 'man' and 'manu,' the words, and indicating neuter gender. Be real DAMNED careful when calling me down on a point like that. It detracts from the sincerity of your argument to be so blatantly wrong; furthermore, it makes you look dumb and vindicative.)

B. What difference does it make that the gender-specific meaning is more recent? That doesn't remove it! The gender-specific meaning, if anything, is fresher, and thus more painful to those who (unlike you) have been sensitized to it.

(Remove it? You mean, you'd prefer there be no word for 'one male human being?' The English language presents both meanings for our use, and both are equally valid. The fact that the two different words 'man' (person) and 'man' (male) are homonyms look and sound alike is unfortunate, but it's just that way. It is left to the user of the language to develop the skill to recognize which meaning is intended by another person. If a person lacks the skill to be able to tell the two meanings apart, it is a failure of the user, NOT a failure of the language. Claiming that the two words are identical in all ways, or that one meaning eclipses the other, is ignorant and lazy.)

C. Once you realize that people are pained greatly by being left out of ordinary discourse (the great achievements of 'man'...etc.) you will see why they wish to shift the patterns of usage to a less sexist position. Unfortunately, because you don't understand the pain, you fail to believe that the common usage really is sexist, and you can't quite understand what the noise is all about. As to the use of the plural, would you rather have people going around using words like 'per' as a genderless third-person singular pronoun? I think that the plural is far preferable to all the weird constructs I have seen to date. It is reasonably natural, already occurs in closely related languages, and involves no great difficulty in learning its use.

(Right. It is also wrong, not to mention unnecessary. There is a perfectly good neuter word meaning 'the race of all human beings,' and that word is 'man', or 'mankind' if you prefer. It excludes no one. If the usage offends you because you believe 'man' in that context carries masculine gender, look it up in the dictionary: the little 'n.' after the word stands for 'neuter.' If it still offends you because you'd prefer it another way, then you're throwing a temper tantrum, and that doesn't speak well for your maturity. I read the dictionary and believe in it; it is the documentation of our language, which is the documentation of all American communication.)

D. I must admit that I find constructs like 'freshperson' repellent. I prefer 'first year student'. 'Chair' does nicely, without any

'-person' attached. There are fair ways around most of these which offend nobody but the most picky types. You will observe that by substituting 'first year student' for the word you found obnoxious, you might well have avoided offending your female friend. You MUST develop some sensitivity to this pervasive problem. You MUST admit that this society, this culture treats its women like shit, and that something must be done about it immediately. Otherwise you will becomes just another fossil.

(Wow. I MUST have missed something somewhere. I fail to see that our culture treats its women like shit. In many places today women get a better shot than men, and, taking the broad view, I'd say women get their equal rights and chances. There are ethnic and class pockets where this is not yet true, but in such pockets it generally happens that women get treated like shit because they choose to do so--any woman today who is being treated like shit can, if she wishes, find a place where that equal shot can be hers. The choice is hers--which is what counts. 'First year student' is a valid and proper usage--be my guest. 'Freshman' is crisper and short, and just as neuter. Do you know what a 'schwa' is, Jon? Lord, I wish that poor inverted 'e' could be added to the Roman alphabet. The notion that '-man' at the end of a word limits the word to males is simple ignorance. It isn't even pronounced the same as 'man' (male). If you claim it excludes women you are digging for discrimination where none exists. Furthermore, I find it hard to imagine that a woman who feels offended by being called a 'freshman' would enjoy being called a 'chair.' Won't the feminists pillory you for referring to a woman as a device upon which people sit? Ah, but the feminists understand that there are two distinct words, 'chair', and 'chair', with identical pronunciations but different meanings. I smell a fish here. A dead one. An old one.)

(Though it may be a touch less than fair, I have to clip here. What you've seen so far is only one third of Jon's letter; the whole thing could take up an entire Pyro all by itself. I've shot enough trout in Jon's barrel anyway, and he keeps getting himself in deeper and deeper... The bottom line is that ideology is very important to Jon, and rationality and fairness are very important to me. Jon is being very true to the counterculture ideology holding that women are everywhere treated like shit, that minorities deserve special treatment to "pay them back" for years of discrimination, and that Big Business is the root of all evil. To all these points there is a core of truth (often a small core) and a large coating of exaggeration. Furthermore, politically-motivated fiddling with the language makes it much harder to get at the truth; it's akin to jiggering your formulae to come out with all even numbers.

Ideology often feels good but rarely contributes to improving the human lot; to stick the knife in a bit further, ideology doesn't coax electricity out of a wall socket. Its major purpose is to put thoughts into heads which have no ability to originate their own, which is both dangerous and sad. So come on, Jon. Do something original. Don't hand me somebody else's party line. Think! And if you still consider me a calculated sexist, speak to some of the women who know me well. Thanks for writing.)

FROM CLYDE JONES--I like the Fenton Silencer. Even if it doesn't work. I also like RF jammers, and they do work. I know it is somewhat illegal to carry around a beam-caster of RF energies and blast indiscriminately at people and objects, but it may be preferable to the Crazy Box. Following, my humble ideas:

All AM receivers that I ever heard of have a superhet circuit. 455kc, I believe, is the intermediate frequency. FM receivers use another intermediate frequency (JEFF??? was ist es?) (10.7 Mhz--Ed.) Two little resonance areas that are critical to the reception of distorted music or sousaphone engrams. Sooooo....

What would be the effect of hitting a Crazy Box with a beam of raw noise on those two frequencies? Jamming. Maybe the thing wouldn't be quiet, but the operator--assuming he wasn't so far gone to be oblivious to the caucaphone he is now carrying--would probably turn it off, for the time being.

Electronically: How about a coupOle of PLL's operating in the VCO mode, putting out the carriers? Or a couple of free-running CMOS oscillators? Using 1 4069 you can get either two oscillators or one set of isolators/boosters, or two RF oscillators and one noise generator. Then gate them into either one single RF amplifying set of transistors, or two independent amps, and then into a set of fractional wave antennas, or coils. The thing should be miniscule, almost the size of a pack of Camels. Power consumption might get rather high, but, (it is to be hoped) you won't have to use it all that often.

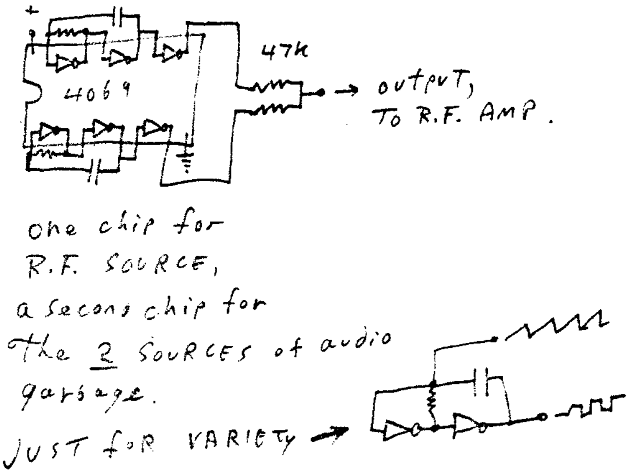
Following is a crude, simple and unrefined possible schematic for the Beaste. Over to you hams.

QRP QRP QRP, QUE PASSE?

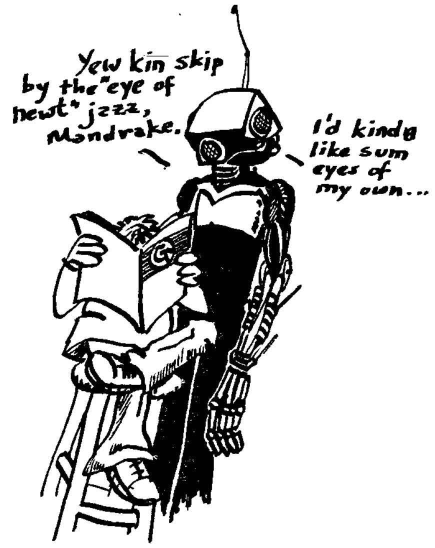
Gee, with enough punch, it might even get into the amp directly, jamming even if the Crazy Box carrier is listening to tapes! Pazooo!

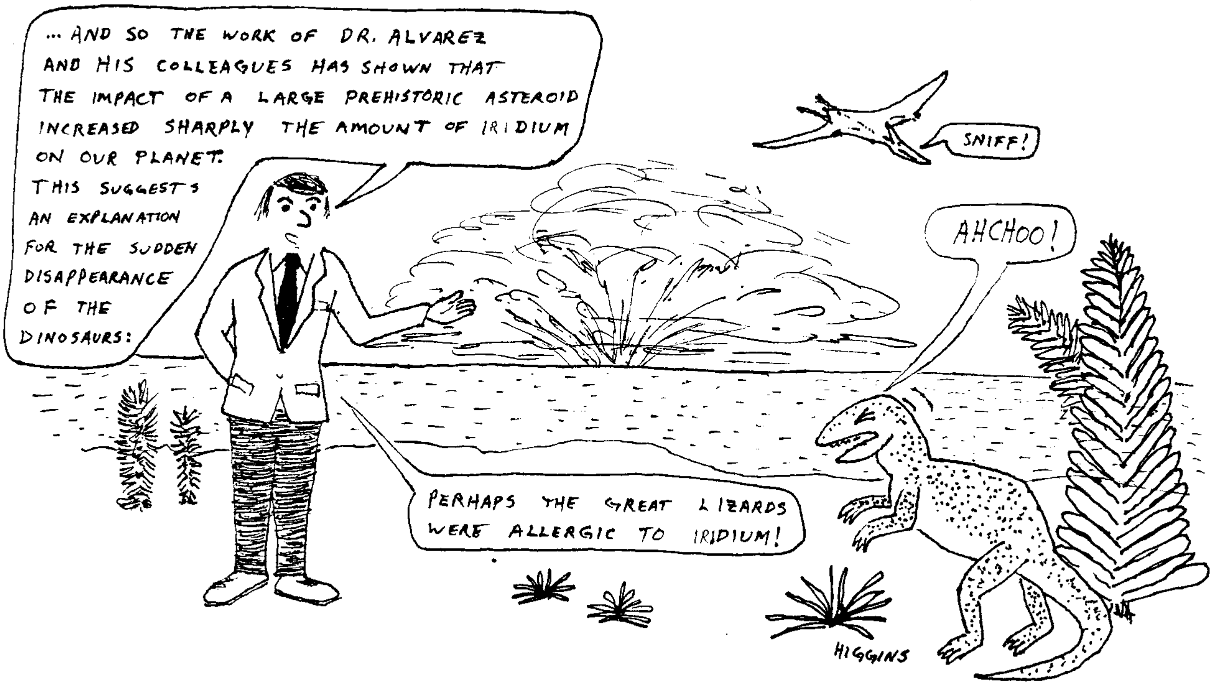
(I guess. Problem is, for that much power, the jammer would have to be the size of a pack of camels, instead of a pack of Camels. --Ed.)

GIGOGIGOGIGOGIGOGIGOGIGOGIGOGIGOGIGOGIGOGIGOGIGOGI



one chip for
R.F. SOURCE,
a second chip for
the 2 SOURCES of audio
garbage.


Yew kin skip by the "eye of newt" jzzz, Mandrake.
I'd kinda like sum eyes of my own...


...AND SO THE WORK OF DR. ALVAREZ AND HIS COLLEAGUES HAS SHOWN THAT THE IMPACT OF A LARGE PREHISTORIC ASTEROID INCREASED SHARPLY THE AMOUNT OF IRIDIUM ON OUR PLANET. THIS SUGGESTS AN EXPLANATION FOR THE SUDDEN DISAPPEARANCE OF THE DINOSAURS:
SNIFF!
AHCHOO!
PERHAPS THE GREAT LIZARDS WERE ALLERGIC TO IRIDIUM!
HIGGINS

Everything but the Kitchen Synchrotron

by Bill Higgins

Have you ever worked in a place where the air condensed on the plumbing?

On the test stands at Fermilab's Magnet Test Facility sit six superconducting magnets. Every time one is cooling down to nearly zero degrees Kelvin, or warming up again, liquid helium rushes through bare copper pipes into the stand. It's only a test setup, so why worry about elaborate insulation? We can always liquefy the helium again.

The copper tubing is cold enough to condense not only water and carbon dioxide vapor, but oxygen and nitrogen. Since oxygen has the higher liquefaction point, the stuff dripping from the pipe is enriched in this element. Technicians find it great fun to catch the O_2 in styrofoam cups, let it distill even more, and then play all the tricks one can play with concentrated oxygen. Preferably out in the parking lot, where explosions and violent fires can't hurt much.

"Be careful," I was told when I came to work at MTF. "There are things out there you can Stick To..."

Even before the Main Ring at Fermilab had seen its first proton, Bob Wilson and his buddies were already planning how to build an even bigger machine. Much of the cost of a new accelerator is due to the construction of its tunnel. We could save a great deal of money if we could build the new machine in the same tunnel. There's plenty of room for another full string of magnets; the tunnel is over three meters in diameter, and the present magnets are about half a meter wide. But to confine more energetic protons to a circle the same size as the Main Ring, one must guide them with a magnetic field much stronger than that of the Main Ring magnets. These operate at about fifteen kilogauss (or 1.5 Tesla, for you metric freaks).

Improving the field required a basic change in magnet technology. Magnets with iron pole faces reach "saturation" when all the microscopic domains, the little compass needles, inside the iron are aligned with each other. You can go on putting as much current as you want into the coils, but the field will never get bigger than fifteen or twenty kilogauss. Iron pole faces are dependable and cheap, but for very large fields the designers must bid them a reluctant adieu.

The next obstacle in the path to stronger magnets is power. It is possible, simply by running a lot of current through a set of coils or "windings," to reach theoretically unlimited field strengths. While the field strength is proportional to the current, however, the power--and therefore the energy-- consumed by the magnet is proportional to the square of the current. So the magnet builder soon finds his electric bills ballooning when he makes only a modest increase in performance. Meanwhile, some fraction of the power is turning into heat, and the cooling of the magnet then becomes more difficult.

At this point a designer begins to look longingly at superconducting materials, which have zero electrical resistance. A magnet wound from superconducting wire would generate no heat, and once it was running at a high current, that current could be maintained with only a small power supply (to take care of losses in non-superconducting components of the system).

Superconductors, though, can operate only within a narrow range of conditions. Everybody knows that supeconducting properties appear only at very low temperatures-- less than ten Kelvin degrees, where helium is liquid or gaseous and every other substance is solid. Superconductors are also touchy if the current through them or the magnetic field around them are too large. When temperature, field, or current are too high, the superconducting wire will "quench" and become an ordinary resistive metal. Even if this happens in a small local area inside the magnet's windings, current flowing through the newly created "resistor" will heat it up, and the hot spot will spread. In a second or two the ensuing chain reaction will cause the entire magnet to quench.

Though superconductivity was discovered in 1905 by Kammerlingh Onnes, alloys which could withstand large currents and fields were not available until the 1960s. Only then did large special-purpose magnets proliferate. Along with them grew proposals for applications on a larger scale: loss-free superconducting powerlines and generators, fast magnetically levitated trains, giant catapults. And, of course, superconducting particle accelerators.

Fermilab's magnet builders, knowing they were to use the existing tunnel, first had to decide what fields they would try to reach. This would detrermine the energy of the new accelerator and the design of the magnets. They chose a figure of 44 kilogauss, corresponding to a proton energy of 1000 GeV-- a convenient one trillion electron volts (TeV). The Main Ring can operate reliably at 400 GeV, though it has reached 500 on a couple of occasions.

The center of the magnet is a pipe, six meters long and about seven and a half centimeters wide, through which the protons will pass. It must hold a high vacuum and withstand liquid helium temperatures. Outside the pipe are the coils of superconducting wire (see diagram). There are two layers of these, wound so as to produce a nearly constant magnetic field inside the pipe when current passes through them.

With the current on, large forces push on the windings, and in order to keep the field uniform they must be held in place. Ring-shaped collars surround the coils to constrain them. Once fitted on, they are placed into a press, which squashes the collars and coils under many tons of pressure, and then welded.

The collar-and-coil assembly sits inside a "cryostat," a container much like three concentric thermos bottles. Liquid helium will flow through the inner layer, "two-phase" or boiling liquid and gaseous helium through the middle, and liquid nitrogen, at 77° Kelvin, through the outer layer. Each layer protects the ones inside it from "heat leaks" from the outside world. Vacuum and insulation between the layers help to keep the coils at their operating temperature, 4.7° Kelvin.

The cryostat, a cylinder about 20 cm in diameter, is surrounded by a massive iron yoke which gives the magnet its boxy shape. Acting as a shield, the iron stops the magnet from sucking up nearby wrenches, belt buckles, and other debris.

The Tevatron will require 774 dipole magnets for bending the beam and 216 quadrupoles or focusing magnets. (The quadrupoles are shorter but fairly similar to the dipoles I've described.) Fermilab is building its own magnets,and has recently drafted me into the group testing the finished products.

(By contrast, Brookhaven National Laboratory on Long Island is ordering the magnets for its new accelerator from Westinghouse. Isabelle, as it's known, is a 400-GeV-on-400-Gev colliding-proton machine. Its magnets will feature a room-temperature beam pipe, but their iron and coils will be cold.)

Employment of superconducting technology makes the business of providing cooling, vacuum, and quench protection quite tricky. When we turned on our newly built Central Helium Liquefier, we doubled the world's capacity to make liquid helium. Of course plumbing and refrigerators for the liquid nitrogen and helium have to be built all around the ring.

Protons circle the machine at least several billion times while they are being accelerated. The vacuum in the beam pipe must be good to prevent too much scattering from air molecules in its the path of the beam. (This has nothing to do with the insulating vacuum between layers in the cryostat, but is inside the central pipe itself.) For colliding beam or antiproton storage, which must keep particles circulating for periods of several days, vacuum pumping is even more critical. Fortunately, the low temperature of the pipe walls helps the pumps a bit: any gas which contacts the walls at four degrees above Absolute Zero will lose much of its enthusiasm and perhaps "condense" out on the pipe.

Tens or hundreds of kilojoules can be released when a magnet quenches. This energy could do considerable damage-- and did, in some early tests-- to the magnet and its surroundings. If the bath of liquid helium boils, the gas generated occupies 600 times the volume of the liquid, which can lead to an impressive explosion. An elaborate quench protection system must be installed to open valves and to shunt massive currents into an external resistor at the slightest sign of resistance in the magnet. The electronics doing this job also fires heater circuits to warm up the magnet coils, so they have a higher resistance than the current-dumping resistor. This will make the current eager to rush into the dump, and reluctant to stay behind and cause damage to the magnet.

Power is provided by fairly ordinary magnet power supplies, about 5000 amperes in capacity. Getting electricity from the copper busbars of the supply into the supercold windings of the magnet did take some fancy engineering. The Tevatron ring will consume much less power than the Main Ring at a given energy, and the power cost of keeping all those refrigerators going is small compared with this saving. The Main Ring will accelerate protons to around 150 GeV, then inject them into the superconducting ring for storage or acceleration to higher energies.

Before all these lumps of technology become an accelerator, though, somebody has to see whether they work as advertised. That's where my group comes in. Finished magnets are mounted on our test stands, our refrigeration people cool them down, and we attack them with Hall effect probes, nuclear magnetic resonance measurements, various bizarre coils, and a judicious pile of computer software.

We measure the magnetic field's strength and direction in detail. What direction does it point in? What departures does it make from a constant value? What misalignment might the field have from its intended direction? We also study the quenching behavior of the magnet. At what current does it quench? Do the heaters work properly? What are its electrical characteristics?

The quality of the field is important because, as I said, a particle passes through the magnet many, many times. A small deviation in the field can be magnified enough after all those passes to lose the beam entirely. Corrections can be made for this-- but only if the accelerator designers know the little peculiarities of each magnet.

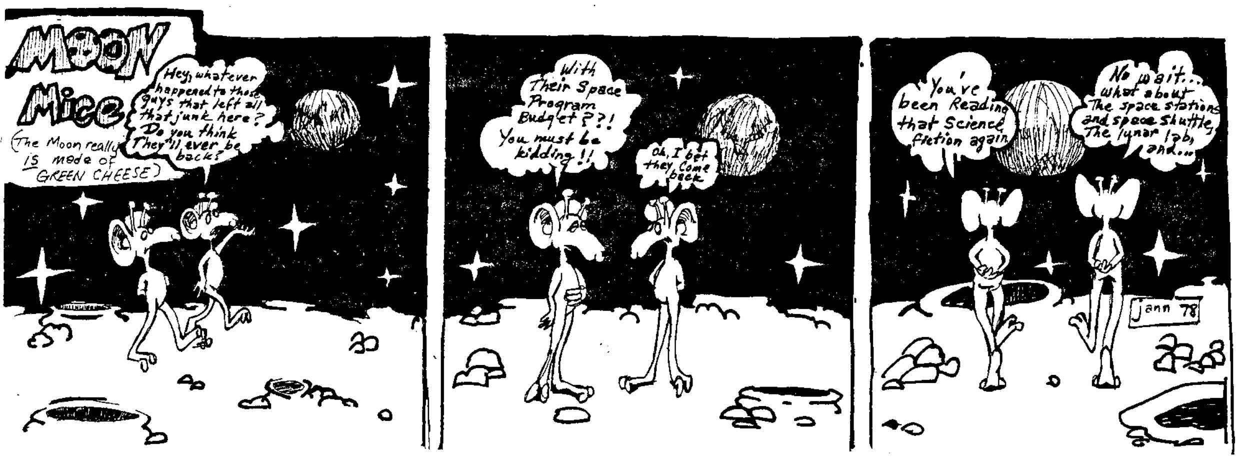
So at MTF, our precision measurements are paving the way for the future of Fermilab. If we get tired of that, we can always grab a cup of air and head for the parking lot. Let me show you a trick with a lighted cigarette...

Quarks

Well, gee, been a long time since the last Pyro, no? Sorry about that. Lots of contributing factors; the main one being an aspect of relativity that Einstein missed: The older you get, the shorter the seconds become. That, and the fact that I have been obligated to write my own mailing label program before being able to send you folks anything. Phonedex is now pretty much finished, at least as far as labels are concerned. I guess that excuse is no longer any good...

By popular demand, you no longer have to turn your Pyro sideways to read the masthead. So much for the rise and fall of modern journalism graphics at PyroTechnics. Let it not be said that the Vox Populi is not heard!

We will be re-mailing an updated Moblist portion of the Information Handbook early in the summer. Lotsa moving around going on, as is the American way; the Mob seldom remains current for


MOON Mice
(The Moon really IS made of GREEN CHEESE)
Hey, whatever happened to those guys that left all that junk here? Do you think They'll ever be back?
With Their Space Program Budget ??! You must be kidding!!
Oh, I bet they come back
You've been Reading that Science fiction again
No wait... what about The space stations and space shuttle, The lunar lab, and...
Jann 78

longer than about ten minutes. As the GT Electronic Mail Project matures, people with terminals or computers and a modem will be able to call Ariel and download their very own copy of the Mob at any time. Ditto leaving me messages and even uploading your own Pyro copy. I'm pondering an entry in the Mob file containing the current number of stamps in your envelope; if this can be done with any reasonable amount of effort you will be able to check your supply at will and send more when the occasion demands. Ariel should be monitoring the phone line most of the time starting in August or thereabouts. I'm beginning to shop for hard disk drives, and hope to have 26 megabytes on-line by the end of the year.

The Electronic Mail Project is coming along. Mike Bentley and I have about 40% of it coded and limping along. It's grown beyond Techterm to include Phonedex and Techhost. Phonedex is nearly finished; Techterm is about a third of the way there, and Techhost exists only on paper. We're calling the whole system THEMIS (Telecomm/Hardcopy Electronic Mail Interface System) and any GTer with a CP/M computer system can have it for free. Once it's mature Mike and I will be selling it to the public at large, price not yet determined. Pyro 28 will contain a fairly complete spec on THEMIS; watch for it.

Mike Bentley is interviewing with a number of local companies, including Xerox, Kodak, and Computer Consoles, Inc. of Rochester, and will be moving here sometime soon after somebody makes him an offer he can't refuse. Alice Insley will be coming along after she graduates from U of I in May. Anybody else interested? Keith, come home again! We won't make you live in Penfield! Promise!

Herb Johnson got tired of those nasty Columbus fire ants and headed north to Rochester as well, and now pulls 6800 controller systems out of his hat at Eastman Kodak. Susanna West accompanied him and is hunting around for a museum job. Getting downright fannish around hyar.

Roxanne Meida is now living in Chicago. Mary Lynn Skirvin is moving to Indianapolis. Captain Al is interviewing with aerospace firms and could turn up damned near anywhere, but I suspect his transporter will deposit him in the Pacific Northwest, where they grow most metal things that fly. Michelle Colsher is edging closer to the fire, heading in from the edge of never to Oak Park, probably in May.

Aardvark Technical Services, ably partnered by our own Jane Ellen Olsen, is taking out full page ads in the major hobbyist computer magazines, and evidently is hitting the big time with their OSI software products. The artwork in their ad is by our polymath charter agitator, Tullio Proni. Pick up a Kilobaud and check it out.

Lee Hart and John Hasler are building a robot moopsball. You heard me right. Next time you dive in to give the old moop a whack, you may be in for a surprise: it may duck. The effort hinges about an automobile alternator working as a gyroscope and some imaginative applications of the precession principle, and promises to put some new and rather chaotic life into a game which has more than enough as it is.

Lee and John have also developed an old gadget with a new wrinkle: A trekkie blinker with an 1802 as the only active component, and pretty close to the only component. What it does is leave the data bus pins open, and drives MV50 LED's directly from the address lines. An RC network runs the on-chip clock at about 10 HZ or so. The data bus pins read empty air and execute it by putting out a reasonably random pattern on the address lines. Arguably the single most worthless microprocessor application yet, and having heard some of the talk around the industry, that's going some. Lee & John are willing to make a "baggie-style" parts kit available for people who'd like one of their own. Good chance you'll see the original at Marcon. It's whacky, but neat. They also asked that I mention their 1802 computer board, available now with a solder mask and greatly improved manuals, soon available with their own homegrown version of 1802 FORTH. It is the finest 1802 product I have ever seen, whups the old ELF handily, especially for robots and other similar controller-type applications.

Speaking of which--get ready for the Cuyahoga County Robot Run. Let's all go down and watch the robot races, folks--October 24-25 around the Hanna Fountains in Cleveland. Ranger Two will be taking on all comers in a madass dash from the starting line to the newspaper stand, where they must (*get*) a newspaper and return with it. Furthermore, no guiding boxes allowed. Furtherfurthermore, the machine must be programmable by a 14 year old person. Yeah, well, it sounds impossible to me too; or at any rate those limitations REALLY thin out the field. Unless the 14 year olds you know are a bit more intelligent than the ones in my neighborhood...

Cosmo will not be competing; if he ever rolls again it will be as a greatly improved beast, with a couple of computers and big stepper motors. But to be quite honest, I think I've burned out a little on robots. I've been known to change my mind, and I do tinker with him now and then, but there's LOTS to be done...

George Ewing joins the hacker ranks with the purchase of a Heathkit H89 computer. He'd like anyone with compatible software to give him a holler, and is extremely interested in computer data transfer over the ham radio bands. He is also willing to assemble H89's for less markup than Heath, if you want one but don't want to build one. Prospective H89 owners contact George for more data.

Hugo nomination ballots must be mailed by the 15th of March. You may or may not get this before that time (we're trying, really!) but in case you either haven't sent your ballot off, or haven't joined yet but want to, we want to noodge you a little--there may still be time.

We threw out a few names last time for people who ought to be nominated, out of the Pyro family of artists, writers, and assorted crazies. I want to add Bill Higgins to the Fan Writer column, for sure. I'll repeat verbatim what I printed last time:

Best Fanzine: PyroTechnics

Best Fan Artist: Chris Cloutier, Bill Higgins

Best Fan Writer: George "Zaps" Ewing

Best Pro Artist: Phil Foglio

Your editor had three items appear in print this past year, for which he brazenly solicits recommendations, all short stories: "Cold Hands," in IASFM 6/80; "Ariel," in the anthology Tales of the Marvelous Machine, Taylor & Green, Eds.; and "Guardian," IASFM 9/80. Other GT pro writers were quiescent in 1980, as far as I know; if somebody out there was published professionally, please let me know.

Some people think it's in bad taste to nag votes for your friends or your own zine or, god knows, your own fiction. That's an arguable point, but consider this: The Hugo's are less a measure of quality than a measure of a work/creator's Glow In The Dark Index; keeping a high profile counts for lots, and keeping deliberately obscure is usually fatal. PyroTechnics reaches fewer than 150 people each issue, and that's pretty obscure next to some fanzines with measurably less quality than ours.

It comes down to this: if you aren't noticed you haven't got a chance, no matter HOW good you are. I would probably be a better known writer if I published more than a story or two a year, but I just don't write that quickly--instant obscurity, regardless of quality.

Furthermore, there is precedent. IASFM sent a copy of the November '79 magazine to every member of SFWA, with a noodge to vote for Barry Longyear's story, "Enemy Mine." Guess what won? The same thing recently for one of Somtow Sukuritkul's rather silly "Mallworld" stories. Ditto for Tevis's novel Mockingbird. I would be embarrassed to be that blatant. Probably. So what I'm asking here shouldn't be considered extreme.

Nominate the Pyro slate. Send your ballot in NOW, and if you're not yet a member of the '81 Denver Worldcon, you can send your money along with the ballot, and it will be counted. But not for long.

Let's see if we can't turn up the glow in the dark a bit...

Standards for inconsequential trivia

PHILIP A SIMPSON

10^{-15} bismol = 1 femto-bismol
10^{-12} boos = 1 picoboo
1 boo^{2} = 1 boo boo
10^{-18} boys = 1 attoboy
10^{12} bulls = 1 terabull
10^{1} cards = 1 decacards
10^{-9} goats = 1 nanogoat
2 gorics = 1 paregoric
10^{-3} ink machines = 1 millink machine
10^{9} los = 1 gigalo
10^{-1} mate = 1 decimate
10^{-2} mental = 1 centimental
10^{-2} pedes = 1 centipede
10^{6} phones = 1 megaphone
10^{-6} phones = 1 microphone
10^{12} pins = 1 terapin

JEFF & CAROL DUNTEMANN
301 SUSQUEHANNA ROAD
ROCHESTER NY 14618